

## CLAIMS

What is claimed is:

- 1 1. A method for enabling remote access to and retrieval of files of a web services  
2 application, said method comprising:  
3 defining a virtual directory within a web container hosting the web services application,  
4 said virtual directory specifying a location of specific list of files having a given pattern, wherein  
5 said web container recognizes requests that include said virtual directory;  
6 registering each file pattern of said files with said web container; and  
7 when a request is received with said virtual directory appended to a universal resource  
8 locator (URL) of the web services application, recognizing said client request as a request to  
9 retrieve one of said files.
- 1 2. The method of Claim 1, further comprising:  
2 receiving the request from a requestor;  
3 analyzing said request to determine if said request contains the virtual directory appended  
4 to the URL; and  
5 when said request does not contain the virtual directory, initiating an invocation of the  
6 web services application corresponding to said URL and providing said requestor with access to  
7 functionality of said web services application.
- 1 3. The method of Claim 1, further comprising:  
2 storing each of said files with predefined file patterns at a pre-specified directory path  
3 within said web container, which path is associated with an endpoint directory of said web  
4 services application, wherein all file searches occur within said pre-specified directory and  
5 subdirectories affiliated therewith.
- 1 4. The method of Claim 3, wherein said step of recognizing said request as a request for  
2 retrieval of a file further comprises:  
3 identifying whether a filename is appended to said virtual directory; and

4           when no filename is appended to said virtual directory, returning an outermost file from  
5 said pre-specified directory to said requestor.

1   5.     The method of Claim 4, wherein, when a filename is appended to said directory, said  
2 method further comprises:

3           determining whether said filename has a correct predefined pattern;

4           when said filename has said correct predefined pattern, searching said pre-specified  
5 directory for said filename; and

6           when said filename is found, returning said copy of said file from said pre-specified  
7 directory to said requestor.

1   6.     The method of claim 5, further comprising:

2           generating a correct Simple Object Access Protocol (SOAP) address for said file; and

3           returning said SOAP address along with said copy of said file to said requestor.

1   7.     The method of Claim 5, further comprising:

2           returning an error message indicating that said filename does not exist within said pre-  
3 specified directory when the filename does not have a correct predefined pattern; and

4           returning an outermost file from said endpoint directory to said requestor and messaging  
5 said requestor that the filename does not exist when the filename does have a correct predefined  
6 pattern but is not found within said pre-specified directory.

1   8.     The method of Claim 1, further comprising:

2           registering said filenames and predefined patterns with the applications server, wherein  
3 said applications server recognizes that a request for a file having said pattern is found at a pre-  
4 established directory.

5           encoding an automatic response by said applications server, wherein said applications  
6 server automatically forwards all requests for files with said predefined pattern to the web  
7 container hosting the web services application; and

8           providing the file pattern to a requestor during a publication of the web services  
9 application's wsdl (web services definition language) document.

1 9. The method of Claim 1, further comprising:  
2 adding an associated wsdl accessing URL-pattern at a runtime initialization phase for  
3 URL pattern for each registered web services application;  
4 providing dynamic servlet registration, wherein when a web container runtime is  
5 initialized, a corresponding wsdl accessing URL-pattern is generated for each URL mapping of  
6 web services servlet; and  
7 modifying said servlet to be able to recognize and handle the new URL pattern via a wsdl  
8 search algorithm.

1 10. The method of Claim 9, further comprising:  
2 implementing said search algorithm according to established criteria from among (1)  
3 maintaining referential integrity among filenames and their root directory; (2) non-modification  
4 of original existing deployment definitions files; and (3) non-modification of original wsdl files.

1 11. The method of Claim 9, wherein said adding step includes:  
2 placing all wsdl files within a single predefined directory; and  
3 enabling all soap addresses to only appear in an outermost file.

1 12. A web server comprising:  
2 a web services application having an associated URL by which remote access to  
3 the web services application is provided; and  
4 a web container hosting said web services application, said web container having a  
5 plurality of web services servlets and mechanism to:  
6 add an associated wsdl accessing URL-pattern at a runtime initialization phase for  
7 URL pattern for each registered web services application;  
8 provide dynamic servlet registration, wherein when a web container runtime is  
9 initialized, a corresponding wsdl accessing URL-pattern is generated for each URL  
10 mapping of web services servlet; and  
11 modify said servlet to be able to recognize and handle the a new URL pattern via  
12 a wsdl search algorithm.

1 13. The web server of Claim 12, further comprising:

2 means for implementing said search algorithm according to established criteria from  
3 among (1) maintaining referential integrity among filenames and their root directory; (2) non-  
4 modification of original existing deployment definitions files; and (3) non-modification of  
5 original wsdl files.

1 14. The web server of Claim 12, wherein said web container mechanism to add wsdl  
2 accessing URL-pattern includes:

3 a single predefined directory within which all wsdl files are placed; and

4 means for enabling all soap addresses to only appear in an outermost file of said  
5 predefined directory.

1 15. The web server of Claim 12, further comprising:

2 means for registering said filenames and predefined patterns with the applications server,  
3 wherein said applications server recognizes that a request for a file having said pattern is found at  
4 a pre-established directory.

5 means for encoding an automatic response by said applications server, wherein said  
6 applications server automatically forwards all requests for files with said predefined pattern to  
7 the web container hosting the web services application; and

8 means for providing the file pattern to a requestor during a publication of the web  
9 services

10 application's wsdl (web services definition language) document.

1 16. The web server of Claim 12, further comprising:

2 means for defining a virtual directory within a web container hosting the web services  
3 application, said virtual directory specifying a location of a specific list of files having a given  
4 pattern, wherein said web container recognizes requests that include said virtual directory;

5 means for registering each file pattern of said files with said web container; and

6 means, when a request is received with said virtual directory appended to a universal  
7 resource locator (URL) of the web services application, for recognizing said request as a request  
8 to retrieve one of said files.

1 17. The web server of Claim 12, further comprising:  
2 means for receiving the request from a requestor;  
3 means for analyzing said request to determine if said request contains the virtual  
4 directory appended to the URL; and  
5 means, when said request does not contain the virtual directory, for initiating an  
6 invocation of the web services application corresponding to said URL and providing said  
7 requestor with access to functionality of said web services application.

1 18. The web server of Claim 12, further comprising:  
2 means for storing each of said files with predefined file patterns at a pre-specified  
3 directory path within said web container, which path is associated with an endpoint directory of  
4 said web services application, wherein all file searches occur within said pre-specified directory  
5 and subdirectories affiliated therewith.

1 19. The web server of Claim 12, wherein said means for recognizing said client request as  
2 request for retrieval of a file further comprises:

3 means for identifying whether a filename is appended to said virtual directory; and

4 means, when no filename is appended to said virtual directory, for returning an outermost  
5 file from said pre-specified directory to said requestor; and

6 means, when a filename is appended to said directory and has a correct predefined  
7 pattern, for:

8 searching said pre-specified directory for said filename; and

9 when said filename is found, returning said copy of said file from said pre-  
10 specified directory to said requestor;

11 generating a correct Simple Object Access Protocol (SOAP) address for said file;

12 and

13 returning said SOAP address along with said copy of said file to said client.

1 20. A computer program product, comprising:

2 a computer readable medium; and

3           program code on said computer readable medium for providing a web server application  
4 that includes:

5           program code for implementing a web services application having an associated  
6 URL by which remote access to the web services application is provided; and

7           program code for enabling functionality to a web container hosting said web  
8 services application, wherein said web container contains a plurality of web services  
9 servlets, said functionality including:

10           adding an associated wsdl accessing URL-pattern at a runtime  
11 initialization phase for URL pattern for each registered web services application;

12           providing dynamic servlet registration, wherein when a web container  
13 runtime is initialized, a corresponding wsdl accessing URL-pattern is generated  
14 for each URL mapping of web services servlet; and

15           modifying said servlet to be able to recognize and handle the a new URL  
16 pattern via a wsdl search algorithm.

1   21.   The computer program product of Claim 20, further comprising:

2           program code for implementing said search algorithm according to established criteria  
3 from among (1) maintaining referential integrity among filenames and their root directory; (2)  
4 non-modification of original existing deployment definitions files; and (3) non-modification of  
5 original wsdl files.

1   22.   The computer program product of Claim 20, wherein said code for enabling web  
2 container functionality to add wsdl accessing URL-pattern includes:

3           program code for identifying a single predefined directory within which all wsdl files are  
4 placed; and

5           program code for enabling all soap addresses to only appear in an outermost file of said  
6 predefined directory.

1 23. The computer program product of Claim 20, further comprising:  
2 program code for registering said filenames and predefined patterns with the applications  
3 server, wherein said applications server recognizes that a request for a file having said pattern is  
4 found at a pre-established directory;  
5 program code for enabling an automatic response by said applications server, wherein  
6 said applications server automatically forwards all requests for files with said predefined pattern  
7 to the web container hosting the web services application; and  
8 program code for providing the file pattern to a client during a publication of the web  
9 services application's wsdl (web services definition language) document.

1 24. The computer program product of Claim 20, further comprising:  
2 program code for defining a virtual directory within a web container hosting the web  
3 services application, said virtual directory specifying a location of specific list of files having a  
4 given pattern, wherein said web container recognizes requests that include said virtual directory;  
5 program code for registering each file pattern of said files with said web container; and  
6 program code for recognizing said request as a request to retrieve one of said files,  
7 whenever a request is received with said virtual directory appended to a universal resource  
8 locator (URL) of the web services application.

1 25. The computer program product of Claim 20, further comprising:  
2 program code for receiving the request from a requestor;  
3 program code for analyzing said request to determine if said request contains the virtual  
4 directory appended to the URL; and  
5 program code for initiating an invocation of the web services application corresponding  
6 to said URL and providing said requestor with access to functionality of said web services  
7 application, when said request does not contain the virtual directory.

1 26. The computer program product of Claim 20, further comprising:  
2 program code for storing each of said files with predefined file patterns at a pre-specified  
3 directory path within said web container, which path is associated with an endpoint directory of

4 said web services application, wherein all file searches occur within said pre-specified directory  
5 and subdirectories affiliated therewith.

1 27. The computer program product of Claim 20, wherein said program code for recognizing  
2 said request as request for retrieval of a file further comprises:

3 program code for identifying whether a filename is appended to said virtual directory; and

4 program code for returning an outermost file from said pre-specified directory to said  
5 requestor when no filename is appended to said virtual directory; and

6 program code, when a filename is appended to said directory and has a correct predefined  
7 pattern, for:

8 searching said pre-specified directory for said filename; and

9 when said filename is found, returning said copy of said file from said pre-  
10 specified directory to said requestor;

11 generating a correct Simple Object Access Protocol (SOAP) address for said file;

12 and

13 returning said SOAP address along with said copy of said file to said requestor.

1 28. The computer program product of Claim 27, further comprising:

2 program code for returning an error message indicating that said filename does not exist  
3 within said pre-specified directory when the filename does not have a correct predefined pattern,  
4 and

5 program code for returning an outermost file from said endpoint directory to said  
6 requestor and messaging said requestor that the filename does not exist when the filename does  
7 have a correct predefined pattern but is not found within said pre-specified directory.

1 29. A method for retrieving files from an endpoint directory of a web services application,  
2 comprising:

3 generating a file request containing a URL of the endpoint directory of the web services  
4 application;

5 adding a name of a virtual directory after the URL, said virtual directory name being  
6 assigned at a web server to host a plurality of files at the endpoint directory;



7 forwarding said file query with said URL and appended virtual directory to a web  
8 container hosting said web services application, wherein said adding of said virtual directory to  
9 said URL is recognized as a file retrieval request by the web server and results in a retrieval of a  
10 copy of a corresponding file in response.

1 30. The method of Claim 29, further comprising:

2 appending to said virtual directory name a particular filename of the file that is being  
3 requested;

4 wherein said retrieval provides a copy of the file identified by said filename at said web  
5 container.

1 31. The method of Claim 30, wherein when said file is located within a sub-directory of said  
2 endpoint directory, said filename comprises a subdirectory delimiter appended to said virtual  
3 directory.

1 32. The method of Claim 29, further comprising:

2 generating said file request based on a published wsdl document of said web services  
3 application, which document provides said URL, and file retrieval information including a name  
4 of said virtual directory and a file pattern;

5 receiving a response from said web container;

6 wherein said response includes an outermost file within an endpoint directory of said web  
7 services application when no filename is appended to said virtual directory within the file  
8 request; and

9 wherein said response includes (1) the specific file associated with the filename that is  
10 appended to the virtual directory in the file request when that filename has a correct file pattern  
11 and (2) a soap address of the specific file.

1 33. The method of Claim 29, wherein said virtual directory is a /wsdl directory and said file  
2 pattern includes a wsdl pattern and an xsd pattern.